III. REMARKS

Status of the Claims

Claims 12, 15, and 16 are amended. Claim 1 is cancelled and new claim 17 is added. Claims 2-11 are amended to be dependent from claim 17. Claims 2-17 are presented for consideration.

Summary of the Office Action

Claims 1-16 stand rejected under 35USC103(a) based on the reference Agrawal, U.S. Patent No. 6,072,990, in view of the teaching in the cited reference Lewis, U.S. Patent No. 5,687,290. The Examiner is respectfully requested to reconsider his rejection in view of the above amendments and the following remarks.

Discussion of the Cited Reference

The Examiner continues to rely on the reference Agrawal as primary support for the rejection based on obviousness. Applicant's prior arguments are still responsive to the subject office action and are repeated herein by reference.

As previously submitted, the reference Agrawal describes a system that utilizes a feed back loop to control transmission power in a channel control scheme. This involves an iterative process in which repeated feedback of unsatisfactory performance results in changes to transmission parameters (see column 2, lines 16-31). To reduce system overhead costs, the system of Agrawal controls the frequency of feedback by balancing channel quality against control overhead. To accomplish this, the system of Agrawal monitors word error rate over a window of

timeframes to determine an average word error rate. It is only when the average word error rate falls outside the acceptable range that the transmission power is updated (see column 8, lines 3-38). The control parameter in this system is defined as a power code pair, i.e., transmission power and error correction code. In other words, the transmission power and the error correction code are controlled to determine the correct operating point for current link conditions.

The reference Agrawal fails to disclose the use of fuzzy logic to control modulation mode in a wireless communication link. Further, there is no indication in Agrawal that fuzzy logic can be constructed to use packet error rate as a variable.

In order to fill this gap, the Examiner cites the reference Lewis. The reference Lewis describes a network monitor coupled to a communication network. The network monitor is equipped with a fuzzifier module that generates fuzzy input data processed by a fuzzy inference engine. The fuzzy inference engine applies fuzzy rules to determine a fuzzy output. The teaching of Lewis is summarized in column 3, lines 41-47 as follows:

> **"In one embodiment of the invention, the apparatus automatically monitors network operational parameters, processes fuzzy input data representative of the operational parameters using fuzzy logic to provide fuzzy output data that is used to control the operation of the network by adjusting network controller parameters."**

The reference Lewis is nothing more than a generic description of the use of fuzzy logic. From this the

Examiner concludes that it would have been obvious to one skilled in the art to obtain the invention described in the claims of this application. Applicant submits that this is not supported by the cited references.

It seems that the Examiner has combined these two publications because Agrawal discloses word error rate (which the Examiner considers equivalent with the packet error rate) and Lewis discloses the use of fuzzy engine, and because both publications relate to communication technology.

Applicant has revised claim 1 and it is submitted as new claim 17 in response to the Examiner's assertion that claim 1 did not support Applicant's arguments with respect to packetization and packet error rate. In addition independent claims 12, 15, 16 and 17 are amended to more clearly indicate that the modulation modes apply to the connection and not to the packet, as was misinterpreted by the Examiner.

The Examiner continues to assert that the system of the cited reference uses packet error rate in the course of its operation. The system of Agrawal, however, uses, for its particular control purposes, word error rate (WER) or bit error rate (BER). Applicant submits that WER and BER are not the equivalent of packet error rate and therefore, the Examiner's statements with respect to packet error rate are technically incorrect.

Applicant submits the following publications that indicate that that packet error rate is not the equivalent of WER or

BER. Pertinent parts of these articles are abstracted below for the Examiner's convenience:

Abstract 1. In past work, it is illustrated how bit errors are position independent but have a dependence upon the encoded data [6]. It was found that the errors occur uniformly across any data packet, independent of packet size, and that there are no correlations evident between the positions of errors within the frame. This result is interpreted to be confirming that errors are highly localized within a frame and from this we are able to assume that the error-inducing events occur over small (bit-time) time scales. Further, the work compared BER and packet error rate results, noting that frames containing different data contents lead to substantially different BER performance. Importantly, the relationship between the test data and BER results has little connection with the packet error rates for the same test data. This past work illustrated that the BER is not a good indicator of packet error, nor was packet error a useful indicator of BER (www.cl.cam.ac.uk/~awm22/publication/james2005**packet**.pdf)

Abstract 2. Bit Error Rate (BER) and Packet Error Rate (PER) are important Quality of Service Parameters for Wireless network. Most research in QoS has been devoted to the analysis of BER which gives insight to the mean behavior of the wireless network. However, the mean behavior is not sufficient in a lot of scenarios, and a more precise characterization of the error process is needed. An important example where the mean behavior is not sufficient is PER evaluation. As residual errors at the output of the physical layer are not uniformly distributed,

the distribution of these error events is important for deriving PER. Not taking into account this distribution and supposing, for example, that errors are uniformly distributed, as done in a large proportion of published reports on wireless networking, lead to a gross overestimation of PER that can go to tenfold factors. www-rp.lip6.fr/~khalili/pub/mswim2004.pdf

Copies of these articles are attached for the Examiner's convenience. These articles illustrate that word error rate/bit error rate is not equivalent to packet error rate. Applicant submits, therefore, that the cited references fail to teach either alone or in combination the use of packet error rate as a fuzzy logic variable for the control of modulation mode.

The Issue of Obviousness

It is well settled that in order to establish a prima facie case for obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, without reference to the disclosure of this application.

Applicant submits that the above described deficiencies of the primary reference Agrawal are not remedied by the proposed combination with the teaching of the reference Lewis. The combined references do not therefore support a prima-facie case of obviousness. The modification of the teachings of Agrawal or Lewis, in order to obtain the

invention, as described in the claims submitted herein, would not have been obvious to one skilled in the art.

There is nothing in the reference Lewis which suggests that packet error rate may be used as a control variable in a fuzzy logic control engine. Likewise the reference Agrawal is silent with respect to the desirability of using fuzzy logic or packet error rate.

The above arguments apply equally to the rejected dependent claims.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment of $450 for a two month extension of time, and any other fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.